PhD in Water Resources Engineering or Environmental Engineering

School of Engineering, University of Guelph

January 2025 start date

POSITION: Investigating groundwater flow and groundwater-surface water interactions under climate change in the Grand River watershed (Ontario)
ADVISOR and CO-ADVISORS: Dr. Jana Levison, University of Guelph; Dr. Christine Rivard, Geological Survey of Canada; Dr. Steven Frey, Aquanty Inc.
START DATE: January 2025 (4 year duration)
STIPEND: Available for 4 years (stipend is to support tuition and living expenses; research expenses will be covered by the research grant)

PROJECT DESCRIPTION: Groundwater flow patterns and the occurrence of poor-quality water from both natural and anthropogenic contaminants are particularly complex across the region north of Lake Erie (southern Ontario). Quality issues pose serious environmental and health problems, since groundwater is sometimes unfit for consumption or irrigation. It can also sometimes contain methane and/or H_2S (which is toxic). The study area covers approximately 2000 km^2 and corresponds to the lower part of the Grand River watershed. It includes two First Nations reserves with water supply issues. The main objective of this PhD thesis is to characterize the properties of shallow aquifers in the study area and to examine groundwater flow and the dynamics between surface water and groundwater. To this end, this thesis will involve: the collection of relevant existing data, fieldwork, laboratory analyses, interpretation of acquired data, as well as 2D and 3D numerical modeling. Fieldwork will include permeability tests (i.e., slug tests) and the installation of pressure transducers in monitoring wells, permeability tests in surficial sediments using a Guelph permeameter, and sampling of surficial sediment and core samples. Different approaches will be used to estimate the various components of the water budget, including recharge. For modeling purposes, a conceptual model will first be developed based on the existing provincial geological (Quaternary and bedrock) models, which will include estimated hydrogeological property values and boundary conditions. Next, hydrogeological models will be developed to test the estimated property values and conditions, then more complex integrated SW/GW models will be developed based on the knowledge gained from the previous models. The latter will then be used to make predictions, in order to study the impacts of climate change and the fate of contaminant plumes. This work will support land use management and help better plan water supply in problem areas. This thesis is part of a larger multi-institutional project led by the GSC.

EXPERIENCE: Master's in Water Resources Engineering, Environmental Engineering, Civil Engineering, Geological Engineering, Earth Sciences, Environmental Sciences, Geoscience, Geology or related discipline.

Please contact **Jana Levison** at **jlevison@uoguelph.ca** and **Christine Rivard** at **christine.rivard@nrcan-rncan.gc.ca** for more information or to apply for the position. Please send a cover letter outlining your interest in this position as well as how your background makes you a suitable candidate, CV, and a copy of your unofficial transcript. If your application is selected, you will be invited to apply to the federal government's recruitment ad, which will be published in the coming weeks. Fostering a culture of inclusion is an institutional imperative and we invite and encourage applications from all qualified individuals. However, Canadian candidates will be given priority.